

## Softwall Cleanroom Procurement Specifications V1

- **Cleanroom Class:** Meet or exceed Class 10,000 cleanroom requirements
- **Nominal Inside Dimensions:** D8' x L8' x H8'
- **Max External Height:** 9'
- **Frame:** Min 3" white painted tubular steel frame with casters and brakes
- **HEPA Filters:** Minimum for class 10,000 plus 1 for margin
  - Filters should be mounted  $\leq 2'$  from an outer tent edge for maintenance accessibility
- **Ionization Bar Upgrade Option:** Each HEPA filter shall be upgradeable with COTS cleanroom ionization bars mounted below the filter discharge area.
- **Lighting:** Minimum of 2 cleanroom fluorescent 4-lamp T-8 light banks
- **Ceiling Panels:** Cleanroom Ceiling Panels for unoccupied spaces
- **Softwall Curtains:** 40 mil clear Polysim vinyl strips, 12" wide with 2" overlaps strip curtain panels all sides
- **Electrical:** Factory Pre-wired to a frame mounted J-box. With leg mounted independent switches for lights, HEPA filters, & Ionization Bars. Customer to provide electrical connection from J-box to power source (110VAC,  $\leq 20A$ ).
  - Metal Clad cable can be used within the manufactured clean room as long as it complies with the NASA LaRC Standards in Appendix 1
- **Assembly Instructions Included**
- **Delivery Date requirement:** By October 1, 2015 (ship to NASA Kennedy in Cape Canaveral, Florida) – Ship to address will be provided

### Appendix 1

NASA LaRC guidelines for use of Metal Clad (MC) cable for certain applications:

#### 1.1 Raceways

- A. Use raceway systems to contain premises wiring. Install separate equipment grounding conductors (EGC) in the raceways sized to meet the requirements of the NEC, Table 250.122. Do not use raceways as equipment grounding conductors<sup>[1]</sup>. For certain applications, the use of metal clad (MC) cable is permitted as described in Section 2.4, Metal-Clad Cable.<sup>[2]</sup>

---

<sup>[1]</sup> LaRC institutional policy requires complete installation of the raceway system prior to installation of premises system wiring and the installation of separate equipment grounding conductors (EGC) in the raceway. This applies to all premises wiring for service, feeders and branch circuits. This minimizes problems using the raceway as the sole return path for fault currents. A raceway system minimizes the need for splices and connections in the premises wiring circuits and facilitates the addition of future circuits in the raceways.

<sup>[2]</sup> MC Cable with an insulated EGC is similar in function to flexible conduit with an insulated EGC and may be permitted for some applications at LaRC. Other MC Cable configurations relying on use of the metallic sheath, in part or in whole, as the EGC AC Cable is not permitted. The use of cable

<sup>2</sup>

MC Cable with an insulated EGC is similar in function to flexible conduit with an insulated EGC and may be permitted for some applications at LaRC. Other MC Cable configurations relying on use of the metallic sheath, in part or in whole, as the EGC AC Cable is not permitted. The use of cable assemblies, such as non-metallic sheathed cable and Type AC cable (typically referred to as BX Cable) for premises system wiring, is prohibited at LaRC facilities. AC Cable utilizes the metallic sheath as the EGC, which is not permitted at LaRC.

## **2.4 Metal-Clad Cable**

A. Metal-clad (MC) cable may be used for branch circuit wiring when provided as concealed wiring in manufactured moveable partitions, for the wiring provided as an integral part of prefabricated buildings or enclosures, or as part of a manufactured wiring system installed under raised floors in computer rooms.<sup>19,20</sup>

B. Use conduit to connect MC cable systems to the branch circuit panelboard.

C. Only MC Cable provided with an insulated EGC sized in accordance with NEC Table 250.122 is permitted. Use of MC Cable that utilizes the metallic sheath, by itself or in combination with other conductors to achieve the required EGC cross-sectional area, is not permitted.<sup>21</sup>

D. Use 12 AWG minimum conductor size.

1. Use larger size as required by the NEC.

2. Use larger conductor sizes as required to limit voltage drop as required in this Section.

3. Use larger conductor sizes to adjust allowable ampacity if there are more than 3 current-carrying conductors in a cable. Refer to NEC Article 310.15 for adjustment factors.<sup>22</sup>

E. For isolated ground power circuits use cable with a separate grounded conductor for each phase conductor. Uniquely color-code each grounded conductor to associate it to the corresponding phase conductor.

<sup>19</sup> LaRC limits the use of MC cable to manufactured assemblies for use under raised floors, for the wiring provided as an integral part of prefabricated buildings or provided as part of pre-manufactured partitions, which then get connected to the building premises wiring using approved raceways.

<sup>20</sup> IEEE Std 1100, in Chapter 8, discusses the advantages of metal-clad cable for branch circuits serving electronic equipment.

<sup>21</sup> LaRC treats the metallic sheath of an MC Cable to be similar in function to flexible conduit, which, at LaRC, is not permitted to be utilized as an EGC. The requirement to provide an insulated EGC in raceways is extended to MC Cable.

<sup>22</sup> NEC Article 310.15 ampacity adjustments apply to conductors in MC cable.

---

assemblies, such as non-metallic sheathed cable and Type AC cable (typically referred to as BX Cable) for premises system wiring, is prohibited at LaRC facilities. AC Cable utilizes the metallic sheath as the EGC, which is not permitted at LaRC.